<u>SUGGESTED CHANGES TO THE CLAIMS</u>

4. ~~In a~~ <u>A</u> method of designing an acoustic matching layer or layers of a piezoelectric transducer <u>wherein the piezoelectric transducer comprises</u>: ~~including~~

- a piezoelectric plate that is an electric device <u>made</u> of a ceramic <u>material</u> ~~group~~ capable of converting an electric pulse into a sound wave pulse signal,
- a back absorption layer that is a sound wave absorption layer for preventing an echo phenomenon of the piezoelectric plate,
- one or more of the acoustic matching layers that is a thin layer structure constructed in order that sound waves generated in the piezoelectric plate can be transferred in the direction of a front load, and
- an electric matching device that is an electric device for matching an external electric equipment and <u>an</u> electric impedance,

the improvements comprising the steps of:

(1) <u>computing the value of the sensitivity, pulse width and performance index of the piezoelectric transducer based on a KLM model computation and inputting a front load effective impedance</u> ***<u>"somewhere"</u>*** ~~a step in which a front load effective impedance is inputted, and a sensitivity, pulse width and performance index of a piezoelectric transducer are computed based on a KLM model computation~~,

(2) ~~a step in which~~ <u>selecting</u> a minimum value of a front load effective impedance ~~is selected~~ based on [[a]] <u>the</u> sensitivity, pulse width and performance index of the piezoelectric transducer computed in the step (1);

(3) ~~a step in which a~~ inserting the selected minimum value of the front load effective impedance ~~is inserted~~ into the following formula:

$$\ln\frac{Z_{i+1}}{Z_i} = 2^{-n} C_i^n \ln\frac{Z_t}{Z_f^{(0)}}$$

where i=0,...n, $Z_0=(Z_f)^{(0)}$, $Z_{n+1}=Z_t$,

$$C_i^n = \frac{n!}{(n-i)!i!}$$; and

(4) ~~a step in which~~ selecting ~~an~~ the impedance computed in the step (3) ~~is determined~~ as an impedance Z_1, Z_2, and Z_3 of each of the matching layers according to the following Table:

Impedance / Number of layers	Z_1	Z_2	Z_3
1	$((Z_f)^{(0)}(Z_t))^{1/2}$		
2	$(Z_f)^{(0)3/4}(Z_t)^{1/4}$	$(Z_f)^{(0)1/4}(Z_t)^{3/4}$	
3	$(Z_f)^{(0)7/8}(Z_t)^{1/8}$	$(Z_f)^{(0)}(Z_t)^{1/2}$	$(Z_f)^{(0)1/8}(Z_t)^{7/8}$

where Z_f represents an effective impedance of front load viewed from the front side of the piezoelectric plate, and $(Z_f)^{(0)}$ is (Z_f) at the free resonant frequency, and (Z_t) is a front load impedance, and wherein the above results are obtained for a number n of the matching layers n=1, 2 or 3, wherein a video waveform, not a RF waveform, is used for evaluating the sensitivity and pulse width of the piezoelectric transducer.

5. ~~In a~~ A method of designing a piezoelectric transducer, the piezoelectric transducer comprising: ~~including~~

- a piezoelectric plate made of a ceramic ~~group~~ material for converting an electric pulse into a sound wave pulse signal,
- a back sound wave absorption layer for preventing an echo phenomenon of the piezoelectric plate, and
- one to three acoustic matching layers having respective impedances (Z_1, Z_2, Z_3) so that sound waves generated in the piezoelectric plate can be transferred in the direction of a front load, the improvements comprising:
  - selecting a front load impedance (Z_t) and an effective impedance of the front load (Z_f) viewed from a front side of the piezoelectric plate; and
  - determining the impedances (Z_1, Z_2, Z_3) of each of the acoustic matching layers using the following matching formula and table:

$$\ln\frac{Z_{i+1}}{Z_i} = 2^{-n} C_i^n \ln\frac{Z_t}{Z_f^{(0)}}$$, where $i=0,\ldots n$, $Z_0=(Z_f)^{(0)}$, $Z_{n+1}=Z_t$,

$$C_i^n = \frac{n!}{(n-i)!i!}$$; and

Impedance / Number of layers	Z_1	Z_2	Z_3
1	$((Z_f)^{(0)}(Z_t))^{1/2}$		
2	$(Z_f)^{(0)3/4}(Z_t)^{1/4}$	$(Z_f)^{(0)1/4}(Z_t)^{3/4}$	
3	$(Z_f)^{(0)7/8}(Z_t)^{1/8}$	$(Z_f)^{(0)}(Z_t)^{1/2}$	$(Z_f)^{(0)1/8}(Z_t)^{7/8}$

where Z_f represents the effective impedance of front load viewed from the front side of the piezoelectric plate, and $(Z_f)^{(0)}$ is (Z_f) at the free resonant frequency, and (Z_l) is the front load impedance~~, and the above results are obtained~~.